STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

MONITORING AND REPORTING PROGRAM NO. CI-XXXX
FOR
CEMEX, INC.
RHO-CHEM FACILITY
425 ISIS AVENUE, INGELWOOD, CALIFORNIA
(ENHANCED IN-SITU BIOREMEDIATION OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER)

FILE NO. 11-065
ORDER NO. R4-2011-XXXX

TENTATIVE

This Monitoring and Reporting Program (MRP) is issued pursuant to California Water Code section 13267 to Cemex, Inc. (Discharger). This Order is issued to the Discharger because Cemex, Inc. is the person implementing the remediation program. The Order is necessary to assure that the remedial action is implemented properly and operating effectively. This MRP sets forth monitoring and reporting requirements associated with the enhanced in situ bioremediation pilot study (Pilot Study) activities to be performed to treat groundwater impacted with volatile organic compounds (VOCs) associated with the site located at 425 Isis Avenue, Inglewood, California (Figure 1) in accordance with Regional Board Order No. R4-2011-XXXX.

I. REPORTING REQUIREMENTS

A. The Discharger shall implement this MRP beginning on the effective date (December 8, 2011) of Regional Board Order No. R4-2011-XXXX. The Discharger shall submit reports detailing the results of the in situ bioremediation. The Discharger shall submit the following reports pursuant to the respective due dates:

Report	**Report Due**
Implementation Report	90 days following the initial injection of KB-1
Final Report	90 days following the completion of the Pilot Study or full-scale remediation

B. The Discharger shall submit Quarterly monitoring reports under this MRP the Regional Board according to the following schedule:

Monitoring Period	**Report Due**
January – March	April 15
April – May	June 15
June – August	October 15
September – December	January 15

C. If there is no discharge or injection during any reporting period, the report shall so state. Monitoring reports must be addressed to the Regional Board, Attention: Information

Technology Unit.

D. The reports shall contain both tabular and graphical summaries of the monitoring data obtained during the monitoring period. In addition, the Discharger shall explain the compliance record and the corrective actions taken, or planned, which may be needed to bring the discharge into full compliance with the waste discharge requirements (WDRs).

E. Laboratory analyses – all groundwater chemical laboratory analyses shall be conducted at a laboratory certified for such analyses by the California Department of Public Health Environmental Laboratory Accreditation Program (ELAP). A copy of the laboratory certification shall be provided each time a new and/or renewal certification is obtained from ELAP.

F. Groundwater samples shall be analyzed within allowable holding time limits as specified in 40 CFR Part 136. Quality assurance/quality control (QA/QC) samples must be run on the same dates when samples were actually analyzed. The Discharger shall make available for inspection and/or submit the QA/QC documentation upon request by Regional Board staff.

G. Each monitoring report must affirm in writing that "All chemical analyses were conducted at a laboratory certified for such analyses by the California Department of Public Health, and in accordance with current United States Environmental Protection Agency (USEPA) guideline procedures or as specified in this Monitoring Program." Proper chain of custody procedures must be followed and a copy of the completed chain of custody form shall be submitted with the report.

H. Each monitoring report shall contain a separate section titled "Summary of Non-Compliance" which discusses the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with WDRs. This section shall be located at the front of the report and shall clearly list all non-compliance with WDRs.

I. The Discharger shall maintain all sampling and analytical results: date, exact place, and time of sampling; dates analyses were performed; analyst's name; analytical techniques used; and results of all analyses. Such records shall be retained for a minimum of three years.

J. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized to demonstrate compliance with the requirements and, where applicable, shall include results of receiving water observations.

II. ENHANCED IN SITU BIOREMEDIATION INJECTION REPORTING REQUIREMENTS

The Discharger is required to submit an implementation report following the completion of the

TENTATIVE

initial injection phase of the Pilot Study. The implementation report shall include baseline laboratory data, as wells as the injection data and the following information regarding injection activities:

1. Location map showing injection wells,
2. Depths of injection(s), and
3. Total amounts of amendments and bacteria culture (KB-1) injected and dates injected in the reporting period.

III. GROUNDWATER MONITORING PROGRAM

The monitoring well network for the Pilot Study (Pilot Study well network) includes on-site wells MW-3, OW-1, OW-2, GCW-1 and GCW-2 (Figure 2). MW-3 is an existing on-site groundwater monitoring well; OW-1 and OW-2 shall be installed as observation wells; GCW-1 and GCW-2 shall be installed as injection/groundwater recirculation wells. In addition, off-site groundwater monitoring wells MW-7, MW-8 and MW-10 (Figure 3) will be used to support the Pilot Study.

Baseline groundwater samples shall be collected from the Pilot Study well network (MW-3, OW-1, OW-2, GCW-1 and GCW-2) and off-site wells (MW-7, MW-8 and MW-10) prior to carbon substrate injection.

During the first month following the carbon substrate addition, the Pilot Study well network shall be sampled bi-weekly for the characterization of general water quality indicators (dissolved oxygen [DO], pH, specific conductance, temperature, oxidation-reduction potential [ORP], and ferrous iron). Bi-weekly monitoring of the Pilot Study well network shall continue through the third month or until the DO concentration is less than 0.5 milligram per liter (mg/L) and ORP is less than -100 millivolts (mV) at GCW-1. Once physical parameter monitoring indicates that DO is less than 0.5 mg/L and ORP is less than -100 mV, KB-1 shall be added to the injection/groundwater recirculation well GCW-1. Following the addition of KB-1, monthly monitoring events shall be conducted over the duration of the Pilot Study. Additional mid-point and final monitoring events shall be conducted and results shall be compared to the baseline monitoring results. Mid-point monitoring shall be conducted six months after the initial KB-1 injection. Final monitoring will be conducted 12 months after the initial KB-1 injection, or longer if additional injections are necessary during the Pilot Study.

In addition, Bio-Traps shall be installed in wells MW-3, OW-1 and OW-2 to monitor microbial parameters. The Bio-Traps shall be retrieved from the monitoring wells at various time intervals to analyze microbial population via phospholipid fatty acid (PLFA) analysis, *Dehalococooides spp*. (DHC) analysis, and biodegradation rates for tetrachloroethene and its daughter products by compound specific isotope analysis (CSIA).

Groundwater samples from Pilot Study wells and MW-7, MW-8 and MW-10 shall be monitored for the duration of the Pilot Study in accordance with the following monitoring program:

Sample Parameter	Units	Sample Location	Sampling Frequency (see Notes)

TENTATIVE

Field Meter Groundwater Testing			
DO	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly[1], monthly[2], mid-point[3] and final[4]
ORP	mV	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly, monthly, mid-point and final
pH	standard units	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly, monthly, mid-point and final
Temperature	Degrees Celsius (°C)	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly, monthly, mid-point and final
Electrical Specific Conductance	µs/cm	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly, monthly, mid-point and final
Laboratory Groundwater Analysis			
Alkalinity	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Chloride	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
TDS	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Boron	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
VOCs	µg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly and monthly
Total Organic Carbon (TOC)	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, bi-weekly and monthly
Volatile Fatty Acids (VFA)	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Total Kjeldahl Nitrogen (TKN)	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Ammonia	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Total Phosphorus or Ortho-Phosphate	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Dissolved antimony and arsenic	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Carbon Dioxide	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
Sample Parameter	**Units**	**Sample Location**	**Sampling Frequency**
Nitrate and Nitrite	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly

TENTATIVE

Ferrous Iron (Fe^{2+})	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Ferric Iron (Fe^{3+})	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Manganese	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Sulfate	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Methane	µg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Ethene/Ethane	µg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline and monthly
Bromide	mg/L	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline
Bio-Trap[5] Analysis (Bio-Traps shall be analyzed by Microbial Insights)			
PLFA	unit less	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
DHC	cells/bead	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final
		MW-7, MW-8 and MW-10	Baseline
CSIA	ratio (unit less)	MW-3, GCW-1, GCW-2, OW-1 and OW-2	Baseline, mid-point and final

Notes:

1. Bi-weekly monitoring will begin after the injection of the carbon substrate.
2. Bi-weekly monitoring will be converted to monthly monitoring after three months from the carbon substrate injection or when DO is less than (<) 0.5 mg/L, and ORP < -100mV.
3. Mid-point monitoring will be conducted six months after the initial KB-1 injection.
4. Final monitoring will be conducted 12 months after the initial KB-1 injection, or longer if additional injections are necessary during the Pilot Study.
5. Bio-Trap is a registered trade name.

Groundwater from monitoring well MW-3 shall be used to evaluate the potential changes in groundwater chemistry outside the localized treatment zone (Contingency Monitoring). Groundwater data from well MW-3 shall be compared to the baseline samples collected prior to injection of the carbon substrate to determine whether the bromide tracer, vinyl chloride (VC), and/or specific dissolved metals (ferrous iron, manganese, arsenic and antimony) have migrated to this well. In addition, groundwater at off-site monitoring wells MW-7, MW-8 and MW-10 shall be analyzed for DHC if 1) there is a detection of DHC in groundwater at MW-3, or 2) the measurements of DO are less than 1.0 mg/L and the ORP reduces to a negative range in groundwater at MW-3. Groundwater from monitoring wells MW-3, MW-7, MW-8 and MW-10 shall be monitored for the duration of the Pilot Study in accordance with the following monitoring program:

TENTATIVE

Sample Parameter	Units	Sample Location	Sampling Frequency
VOCs	µg/L	MW-3	Mid-point and final
Dissolved antimony and arsenic	mg/L	MW-3	Mid-point and final
Ferrous Iron (Fe^{2+})	mg/L	MW-3	Mid-point and final
Manganese	mg/L	MW-3	Mid-point and final
Bromide	mg/L	MW-3	Mid-point and final
DHC (Bio-Traps)	cells/bead	MW-7, MW-8 and MW-10	Mid-point and final

All groundwater monitoring reports shall include, at a minimum, the following:

a. Well identification, date and time of sampling.
b. Sampler identification and laboratory identification.
c. Quarterly observation of groundwater levels, recorded to 0.01 feet mean sea level and groundwater flow direction.

IV. MONITORING FREQUENCY

Specifications in this monitoring program are subject to periodic revisions. Monitoring requirements may be modified or revised by the Executive Officer based on review of monitoring data submitted pursuant to this Order. Monitoring frequencies may be adjusted to a less frequent basis or parameters and locations removed by the Executive Officer if the Discharger makes a request and the request is supported by statistical trends of monitoring data submitted.

V. CERTIFICATION STATEMENT

Each report shall contain the following declaration:

"I certify under penalty of law that this document, including all attachments and supplemental information, was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment.

Executed on the _____day of _____ at _____.

TENTATIVE

_____(Signature) _____(Title)"

VI. PUBLIC DOCUMENTS

These records and reports are public documents and shall be made available for inspection during normal business hours at the office of the California Regional Water Quality Control Board, Los Angeles Region.

VII. ELECTRONIC SUBMITTAL OF INFORMATION (ESI) TO GEOTRACKER

The Discharger shall submit all reports required under this MRP, including groundwater monitoring data and discharge location data (latitude and longitude), to the State Water Resources Control Board GeoTracker database, in addition to submitting copies to the Regional Board office. Once the Discharger demonstrates mastery of electronic submittal of reports to GeoTracker for the Site, it may request that the Regional Board waive the requirement of submitting hard copies of reports.

Ordered by: _____ Date: _____
Samuel Unger, P.E.
Executive Officer

TENTATIVE